1984

Chemical Weed Control in Sorghum : 1984

Cooperative Extension South Dakota State University

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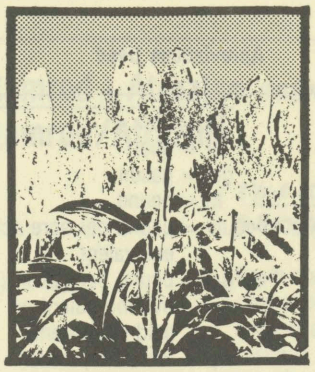
Website: extension.sdstate.edu
Phone: 605-688-4792
Email: sdsu.extension@sdstate.edu



FS 525D

Chemical Weed Control in Sorghum: 1984

Cooperative Extension Service • South Dakota State University • U.S. Department of Agriculture

Leon J. Wrage, Extension agronomist, weeds
W.E. Arnold, professor of plant science

Herbicides are a supplement to and not a replacement for crop rotations, proper seedbed preparation, cultivation, and crop competition.

Sorghum grows slowly the first few weeks after emerging. Weed competition at this time can reduce yields 25% or more. Most annual grasses are less serious in sorghum planted after mid-June.

Proper tillage immediately before planting kills emerged weeds and prevents them from getting a head start on the crop. A rotary hoe or flextine harrow is useful when the crop is small.

Perennial weeds are difficult to control with cultivation. An integrated program of crop rotation, cultivation, and herbicides is most effective.

Herbicide Suggestions

Information in this publication is based on South Dakota Agricultural Experiment Station research and other research or observations. An herbicide is included only after the chemical is registered by the Environmental Protection Agency (EPA) as to residue tolerances in crops used for food or feed.

This information does not imply a guarantee or responsibility for results. The use of tradenames is for reader convenience and does not imply product endorsement. The label should be considered the final guide. Users are responsible for following all label directions and precautions.

Weed Problems. Weeds are grouped as small-seeded annual broadleaves (kochia, lambsquarters, pigweed, etc.), large-seeded annual broadleaves (sunflower, cocklebur, etc,), annual grasses (green or yellow foxtail), or perennial weeds (field bindweed, Canada thistle, etc.). Control is rated poor, fair, good, very good, or excellent for each category of weeds.

Herbicides. Herbicides are listed by tradename, with common name in parentheses. Only the common name is used when the same active ingredient is available in several products.

Treatments listed under "Sorghum Herbicides" are those considered to be promising for most situations in South Dakota. Those listed under "Other Sorghum Herbicides" may be useful for special weed problems, have not been adequately tested, or have given less consistent results.

Rates. Rates for each treatment and each formulation are stated as the amount of product per acre. All rates are on a broadcast basis; adjust accordingly for band application.

Time To Apply. Herbicide may be applied:
PREPLANT INCORPORATED: before the crop is planted, and incorporated as directed.
SHALLOW PREPLANT INCORPORATED: preplant incorporated, but herbicide usually restricted to the top 2 inches of soil with single-pass incorporation.
PREEMERGENCE: after planting but before crop or weeds emerge.
POSTEMERGENCE: after the crop or weeds have emerged.

Reduced Tillage Systems
Furrow and Top-plant

Additional crop residue on the surface may distort the spray pattern or intercept some of the herbicide, reducing weed control. Using the maximum rate for the soil type will partially compensate; however, do not exceed labeled rate. Heavy residue should be worked into the soil before broadcasting soil-applied treatments. Devices to move residue from the row area will improve results for band application.

Do not use preplant incorporated treatments with deep furrow or lister planting, as treated soil is moved from the row area. For these systems, limit band width or preemergence herbicides to the width of furrow bottom. Check herbicide label for restrictions on furrow planted crops.

Band vs. Broadcast

One cultivation is usually needed with broadcast application. Banding reduces the cost per acre and usually replaces one or two row cultivations. Adjust broadcast rates for banding. A 12- to 14-inch band is suggested for top planting; a 7-inch band is suggested for most deep furrow or lister-planted crops.

Irrigated Sorghum

SDSU herbicide performance data are based primarily on dryland tests with limited observations under irrigation. Early season weed control is similar; except overhead irrigation improves results with preemergence herbicides if rainfall is not received before weeds emerge.

Late season weed control is much more critical than on dryland.

Irrigators should:

1. Apply ½ inch of water with overhead irrigation within 5 days of planting if rainfall is inadequate to activate preemergence treatments.
2. Use maximum rate for soil type.
3. Choose treatments that have maximum residual activity for the rotation to improve late season control.
4. Use combination soil applied treatments to control small-seeded annual broadleaves.
5. Use preplant incorporated treatments for furrow irrigation. Preplant incorporated treatments may give slightly better control than preemergence treatments.

File: 2.4—1.5M—1-84mb—ES 133—93
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Herbicides and Formulations

PRODUCT	ACTIVE INGREDIENT & FORMULATION
Ramrod 4L	4 lb/gal-liquid
Ramrod 20G	20% act-gran
Atrazine 4L	4 lb/gal-liquid
Atrazine 80W	80% act-wp
AAtrex Nine-0	90% act-df
Modown 4F	4 lb/gal-liquid
Dual	8 lb/gal-liquid
Lasso	4 lb/gal-liquid
Milogard 4L	4 lb/gal-liquid
Milogard 80W	80% act-wp
Milogard Maxx	90% act-df
Bladex 80W	80% act-wp
Bladex 4L	4 lb/gal-liquid
Lorox 50W	50% act-wp
Lorox 4L	4 lb/gal-liquid
Igran 80W	80% act-wp
2,4-D	4 or 6 lb/gal act-liquid
Banvel	4 lb/gal act-liquid
ME4 Brominal	4 lb/gal act-liquid
Treflan	4 lb/gal act-liquid
Paraquat/Gramoxone	2 lb/gal-liquid
Roundup	3 lb/gal-liquid

Abreviations Used

pt = pint
qt = quart
gal = gallon
lb = pound
lb/A acid equiv = pound per acre acid equivalent
lb/gal = pound per gallon (active ingredient or acid equivalent)
wp = wettable powder
wdg or df = dry flowable (spray)
gran = granule
gpa = gallons per acre
psi = pounds/sq inch pressure
act = active ingredient or acid equivalent

FOLLOW THE LABEL

Federal regulations make it unlawful for any person to use an herbicide in a manner inconsistent with its labeling. This includes the kind of crop and weed; rate, carrier, and other application directions; storage, disposal, and protective clothing; or other precautions stated.

SORGHUM HERBICIDES

(Grain or forage types as specified)

Ramrod (PROPACHLOR)

4-5 qt Ramrod 4L or 20-25 lb Ramrod 20G (broadcast) (4-5 act)

Grain sorghum. Very good to excellent control of several annual grasses. Not for broadleaves. Excellent crop tolerance. Better crop tolerance than most other herbicides on lighter soils. Most consistent preemergence treatment for annual grasses in limited rainfall areas. Has 2-3 weeks shorter residual than Dual or Lasso. Late weeds may emerge in wet seasons or under irrigation.

Granule or flowable formulations are easier to handle and are less irritating than wettable powder. Granules and spray are equally effective. Granules are applied to the soil surface behind the press wheel. Rates of 4 to 5 qt Ramrod or 20 to 25 lb Ramrod 20G per acre (broadcast) have been satisfactory in most SDSU tests. Lower rate is for light, low organic matter soils. Spray formulations may be applied in liquid fertilizer. Minimum carrier is 15 gpa for ground or 5 gpa for air. Ramrod liquid may be applied by air using minimum of 5 gpa carrier. No carryover. Do not graze or feed forage to dairy cattle.

PREEMERGENCE: Requires ⅓ to ¾ inch rain within one week after application. Use shallow harrowing or rotary hoe if weeds emerge before rainfall is received. Travel the same direction as rows if banded.

Apply in a narrow band the width of furrow bottom for lister planted sorghum. Use shallow incorporation in top 2 inches of soil for furrow irrigated sorghum.

Ramrod + Atrazine (PROPACHLOR + ATRAZINE)
Ramrod/Atrazine

2½-4 qt Ramrod 4L + 1-1½ qt atrazine 4L or 1¼-2 lb atrazine 80W or 1.1-1.6 lb AAtrex Nine-0 (2½-4 + 1-1½ act)
5-8 lb Ramrod/atrazine-48% + 21% wp

Grain sorghum. Tank-mix or use commercial premix containing 48% propachlor + 21% atrazine. Very good to excellent control of several annual grasses and very good control of several small-seeded annual broadleaves. Limited control of large-seeded annual broadleaves such as sunflower. Consistent performance if rainfall received. Gives 2 to 3 weeks shorter residual grass control than Dual + atrazine, but requires slightly less rainfall for activation. Better late season annual broadleaf control than Ramrod + Bladex combination. Good broadspectrum, preemergence choice in low rainfall areas if carryover does not interfere with rotation. Excellent crop tolerance to propachlor; fair tolerance to lower atrazine rate in this combination. Crop injury may occur under cool, wet conditions or on alkaline or calcareous soils, or with high rates. Do not use on sandy, low organic matter soils.

Rates of 4 qt Ramrod + atrazine at 1 qt of 4L or 1¼ lb or 80W or 1.1 lb of AAtrex Nine-0 formulation per acre have been satisfactory in most SDSU tests on heavy soils. Tank-mix preferred because it allows the flexibility to use low atrazine rate to minimize carryover. Liquid propachlor formulations are easier to handle and are less irritating than wettable powder. Preemergence applications may be made in liquid fertilizer. Minimum carrier is 15 gpa for ground and 5 gpa for air. Do not graze or feed forage to dairy cattle. Refer to atrazine section for carryover crop limitations.

PREEMERGENCE: As for Ramrod alone.

Ramrod + Bladex (PROPACHLOR + CYANAZINE)

2½-4 qt Ramrod 4L + 1-1½ qt Bladex 4L or 1¼-2 lb Bladex 80W (2½-4 + 1-1½ act)

Grain sorghum. Tank-mix. Very good to excellent control of several annual grasses and very good control of several small-seeded annual broadleaves. Limited control of large-seeded broadleaves such as sunflower. Sometimes weak on pigweed. Consistent performance when rainfall received. Excellent crop tolerance to Ramrod; fair to good tolerance to combination rates of Bladex. Rates of 4 qt Ramrod + Bladex at 1½ qt of 4L or 2 lb of 80W formulation per acre have been satisfactory in most SDSU tests on heavy soils. Do not use on sandy soil. Minimum carrier is 15 gpa for ground. Do not graze or feed forage to dairy cattle. No carryover.

PREEMERGENCE: As for Ramrod alone. Do not apply to emerged crop.

Ramrod + Modown (PROPACHLOR + BIFENOX)

2½-4 qt Ramrod 4L + 3-4 pt Modown 4F (2½-4 + 1½-2 act)

Grain sorghum. Tank-mix. Good control of several annual grasses. Very good to excellent control of pigweed and fair to good control of kochia and lambsquarters. Consistent performance; however, early rainfall critical. Good preemergence combination treatment where pigweed is the major broadleaf problem and carryover must be avoided. Very good crop tolerance. Less sensitive to soil variation than other combination treatments. Use higher rate for heavy weed infestations on heavy soil. Rates of 4 qt Ramrod + 1½ qt Modown 4F per acre are suggested for most soils. Liquid propachlor formulations are less irritating to handle. Ground application in water carrier. Do not graze or feed forage to dairy cattle.

PREEMERGENCE: As for Ramrod alone. Do not incorporate.

Dual (METOLACHLOR)

1½-2½ pt Dual 8E (1½-2½ lb act)

Grain and forage sorghum treated with Concep (safener). Very good control of several annual grasses. Fair on pigweed; does not control most other broadleaves. Consistent results if rainfall or soil moisture requirements are met. Longer control than with propachlor. Tests indicate very good crop tolerance when using treated seed. Severe stand reduction when untreated seed is used. Seed must be treated with Concep (safener) by the seed company. Lower rates are for light, low organic matter soils. Rates of 2 to 2½ pt/A have been satisfactory in SDSU tests on heavy soils. May be applied in liquid fertilizer. Minimum carrier is 10 gpa for ground or 2 gpa for air. No carryover.

SHALLOW PREPLANT INCORPORATED: Usually more consistent than preemergence application in major sorghum area. Incorporate into top 2 inches of soil with a field cultivator, shallow disk, multiweeder, or other suitable equipment during final seedbed operation. Deeper incorporation will reduce control. Improves results when rainfall is very limited but gives slightly less control than preemergence application with adequate rainfall.

PREEMERGENCE: Must have ½ to ¾ inch of rain within one week after application. Rainfall requirement slightly higher than for propachlor. Use harrow or rotary hoe if weeds emerge before rainfall received.

Dual + Atrazine (METOLACHLOR + ATRAZINE)

Bicep

1½-2 pt Dual 8E + 1-1½ qt atrazine 4L or 1¼-2 lb atrazine 80W or 1.1-1.7 lb AAtrex Nine-0 (1½-2 + 1-1½ act)
2.4-3.2 qt Bicep-2½ + 2 lb/gal

Grain and forage sorghum treated with Concep (safener). Tank-mix or use commercial premix containing 2½ lb metolachlor + 2 lb atrazine per gallon. Not for lister planted sorghum. Very good control of several annual grasses and several small-seeded annual broadleaves such as pigweed, kochia, and lambsquarters. Limited control of large-seeded annual broadleaves such as sunflower. Improves broadleaved control compared to Dual alone. Severe stand reduction with untreated seed. Seed must be treated with Concep (safener) by the seed company. Tests indicate very good crop tolerance to Dual when using treated seed or on alkaline or calcareous soils or with higher rates. Use only on medium or heavy textured soils with over 1.5% organic matter. Rates of 2 pt Dual + atrazine at 1 qt of 4L or 1¼ lb of 80W or 1.1 lb of AAtrex Nine-0 formulation per acre are suggested for most heavier soils. Tank-mix preferred as it allows flexibility for reduced atrazine rates if carryover must be minimized. Lower atrazine rates improve crop tolerance.

Bicep suggested only for heavy soils where corn will be planted the following year. May be applied in liquid fertilizer. Minimum carrier is 10 gpa for ground or 2 gpa for air. Refer to atrazine section for carryover crop limitations. Good broadspectrum, late season control if atrazine does not interfere with crop rotation.

SHALLOW PREPLANT INCORPORATED: Incorporate as for Dual alone. Will give more consistent weed control in major sorghum area but slightly less crop tolerance than preemergence especially with higher atrazine rates.

PREEMERGENCE: Same as for Dual alone.

Lasso (ALACHLOR)

2½-3½ qt Lasso (2½-3½ act)

Grain sorghum treated with fluorozole (Screen) safener. Very good control of several annual grasses. Fair on pigweed, does not control most other broadleaves. Results consistent if rainfall is adequate. Somewhat longer control than for propachlor. Tests indicate very good crop tolerance when using treated seed. Severe stand reduction with untreated seed. Seed must be treated with safener by the seed company. Rates of 2½ to 3 qt/A have been satisfactory in most SDSU tests. Lower rates are for light, low organic matter soils. May be applied in liquid fertilizer. Minimum carrier is 10 gpa for ground and 5 gpa for air. No carryover.

SHALLOW PREPLANT INCORPORATED: Incorporate into the top 1 to 2 inches of soil with a field cultivator, multiweeder, or other suitable equipment. Deep incorporation reduces control. Use 1 pt/A more Lasso than for preemergence.

PREEMERGENCE: Must have ½ to ¾ inch of rainfall before weed emergence. Rainfall requirement slightly higher than for propachlor. Use harrow or rotary hoe if weeds emerge before rainfall received.

Lasso + Atrazine (ALACHLOR + ATRAZINE)
Lasso/Atrazine

2-3 qt Lasso + ¾-1¾ qt atrazine 4L or 1-2 lb atrazine 80W or .8-2 lb AAtrex Nine-0 (2-3 + ¾-1¾ lb act)
3½-4½ qt Lasso/atrazine-2½ + 1½ lb/gal

Grain sorghum treated with fluorozole (Screen) safener. Tank-mix or commercial premix containing 2½ lb alachlor + 1.5 lb atrazine per gallon. Not for lister planted sorghum. Very good control of several annual grasses and several annual broadleaves such as pigweed, kochia, and lambsquarters. Limited control of large-seeded broadleaves such as sunflower. Severe stand reduction with untreated seed. Seed must be treated with safener by the seed company. Very good crop tolerance with safened seed. Crop tolerance best at lower atrazine rate. Crop injury may occur under cool, wet conditions or on alkaline or calcareous soils when using higher rates. Not for sandy soil. Rates of 2 qt Lasso + atrazine at 1 qt of 4L or 1¼ lb of 80W or 1.1 lb of AAtrex Nine-0 formulation per acre are suggested for most soils. Tank-mix allows flexibility. Carryover may affect atrazine sensitive crops. Minimum carrier is 10 gpa for ground or 3 gpa for air. May be applied in liquid fertilizer.

SHALLOW PREPLANT INCORPORATED: Incorporate as for Lasso alone. Will give more consistent control in major sorghum area but slightly less crop tolerance than preemergence with high atrazine rates. Use 1 pt/A more Lasso than for preemergence application in tank-mix.

Atrazine + Crop Oil

1¼ qt atrazine 4L or 1½ lb atrazine 80W or 1⅓ lb AAtrex Nine-0 + crop oil (1¼ act)

Grain sorghum, forage sorghum, and sorghum-sundan hybrids. Very good to excellent control of annual broadleaved weeds. Not intended for grass control.

EARLY POSTEMERGENCE: Apply after crop is in 3-leaf stage. Broadleaves should be less than 4 inches high. Fair crop tolerance. Greatest risk is on lighter, low organic matter soil and under wet, cold conditions. Stands can be reduced. Do not use on sandy soil. Use 1 gal/A crop oil or 1 qt/A oil concentrate for ground or 2 qt/A crop oil for air. Minimum carrier is 10 gpa for ground or 2 gpa for air. Do not use liquid fertilizer carrier. Refer to atrazine section for carryover crop limitations.

2,4-D

1 pt 2,4-D amine-4 lb/gal or ½ pt 2,4-D ester-4 lb/gal or ⅓ pt 2,4-D ester-6 lb/gal (¼-½ act)

Grain sorghum. For annual or perennial broadleaf control. Very good control of several annual broadleaves such as sunflower or Russian thistle. Erratic on pigweed under dry conditions. Poor on kochia. Fair crop tolerance. Performance data on varieties not generally available. Growing conditions often affect relative sensitivity. Maximum rates are listed above, and are for most situations. Small, sensitive weeds may be controlled by lower rates. This reduces injury risk. Some labels provide for higher rates to improve perennial weed (field bindweed) control; however, users must assume increased injury risk.

POSTEMERGENCE: Apply when crop is 5 to 12 inches high from soil to tip of whorl leaf. Earlier treatments may inhibit root development and cause lodging; later spraying may cause poor seed development. Use drop nozzles after the crop is 8 inches high to minimize injury.

Labels for 2,4-D vary. Few products include forage sorghums. Some labels include applications of 1 lb/A acid equiv after the dough stage as a harvest aid for grain sorghum. Consult product label.

Banvel (DICAMBA)

½ pt Banvel-4 lb/gal (¼ act)

Grain sorghum. Very good control of annual broadleaves. Has been especially effective on kochia and pigweed. Some perennials may not be emerged at time to treat.

POSTEMERGENCE: Apply before sorghum is 15 inches tall or before 25 days after emergence, whichever comes first. Do not apply over the top after milo is 8 inches tall. Fair crop tolerance. Injury may be severe with application later than recommended. Follow drift precautions. Minimum carrier is 10 gpa for ground and 3 gpa for air. Do not mix with 2,4-D. Do not harvest forage before mature grain stage.

ME4 Brominal (BROMOXYNIL)

½-1 pt ME4 Brominal (¼-½ lb act)

Grain sorghum. Very good to excellent control of seedling annual broadleaves including sunflower, wild buckwheat, and cocklebur. Weeds should be at the 2- to 4-leaf stage. Good kochia control has been observed if plants are small and growing actively. Weak on pigweed. Does not control grasses or eliminate perennials. Large weeds encountered in "rescue" operations are not controlled. Does not cause brittleness or lodging. Some leaf burn may be noted under warm, humid conditions. New growth will be normal. Contact herbicide; coverage important. Minimum carrier is 10 gpa for ground or 5 gpa for air. Do not graze or feed from treated areas for 30 days after application.

POSTEMERGENCE: Sorghum should be at the 2-leaf stage to 14 inches.

OTHER SORGHUM HERBICIDES

Lasso + Modown (ALACHLOR + BIFENOX)

2-3 qt Lasso + 1¼-1⅔ qt Modown 4F

Grain sorghum treated with fluorozole (Screen) safener. Tank-mix. Good control of annual grasses. Very good to excellent control of pigweed and fair to good control of kochia and lambsquarters. Good combination where pigweed is a major problem and carryover must be avoided. Less sensitive to soil variation than other combination treatments. Do not apply after sorghum breaks the soil. Rainfall at time of emergence may cause injury. Use high rate for heavy soil. Rates of 2 to 2½ qt Lasso + 1½ qt Modown 4F per acre are suggested for most soils. May be applied in liquid fertilizer. No carryover.

PREEMERGENCE: As for Lasso alone.

Milogard (PROPAZINE)

4-4¾ pt Milogard 4L or 2½-3 lb Milogard 80W or 2¼-2¾ lb Milogard-Maxx 90 WDG

Grain and forage sorghum. Fair to good control of annual broadleaved weeds. Fair on annual grasses. Weed control is inconsistent. Fair to good crop tolerance. Rate of Milogard at 2 qt of 4L or 2½ lb of 80W or 2.3 lb of Milogard-Maxx formulation has been used in most SDSU tests. Low rates for lighter, low organic matter soils. Do not use on sands. May be applied in liquid fertilizer. Minimum carrier is 20 gpa for 80W, 10 gpa for liquid, and 20 gpa for 90 WDG in ground equipment. Minimum carrier is 5 gpa for liquid or 1 gal/A for each pound of 80W or 2 gpa for 90 WDG. Corn may be planted 12 months after treating. Do not plant other crops for 18 months after application because of carryover.

SHALLOW PREPLANT INCORPORATED: Same as for atrazine alone.

PREEMERGENCE: Rainfall very critical. Generally unsatisfactory results except when rainfall received.

Atrazine

3¼-4½ pt atrazine 4L or 2-2¾ lb atrazine 80W or 1¾-2½ lb AAtrex Nine-0

Grain and forage sorghum, sorghum-sudan hybrids. Excellent control of small-seeded annual broadleaves. Good control of large-seeded annual broadleaves. Poor to fair control of annual grasses. Fair crop tolerance on heavy soils. Risk of injury greatest on light, low organic matter soil and under cold, wet conditions. Stands may be reduced. Do not use on sandy soil. Use high rate on heavy, clay, high organic matter soil.

Preplant or preemergence application may be made in liquid fertilizer. Minimum carrier for preplant or preemergence application is 1 qt carrier for each 1 qt of liquid or 1 gal carrier for each pound of 80W or Nine-0.

Corn or sorghum may be planted the following year. Susceptible crops such as soybeans, sunflowers, small grain, or grass/legumes should not be planted the following year. Lower rate used in combinations reduces carryover, but will still cause damage to susceptible crops. Not for furrow-planted crops. Do not graze or feed forage for 21 days after application.

SHALLOW PREPLANT INCORPORATED: Apply within 2 weeks of planting and incorporate into top 2 inches of soil with a field cultivator or shallow disk during final seedbed preparation. Most consistent application method. Reduced rainfall requirement for activation.

PREEMERGENCE: Requires ¾ to 1 inch of rain within one week of application. Less consistent than preplant. Harrow or rotary hoe if weeds emerge before rainfall received.

EARLY POSTEMERGENCE: Without oil using full rate. Crop completely emerged to 6 inches high. Slightly better crop tolerance but less consistent weed control than other methods unless rainfall received. Minimum carrier is 2 gpa for air and 5 gpa for liquid or 10 gpa for 80W or Nine-0 for ground. Postemergence application using lower rate with crop oil preferred.

Ramrod + Lorox (PROPACHLOR + LINURON)

1-4¾ lb Ramrod 65W + ⅔-3 lb Lorox 50W or ⅓-1½ qt Lorox 4L

Grain sorghum. Tank-mix. Requires ½ to ¾ inch rain within one week after application. Very good annual grass control and fair to good control of some annual broadleaves. Broadleaf control somewhat inconsistent. Good crop tolerance. Use low rate on light, low organic matter soil. Rates of 4⅔ lb of Ramrod 65W + Lorox at 2 lb of 50W or 1 qt of 4L formulation per acre are suggested for most soils with over 3% organic matter. The label includes only Ramrod 65W; rates of 1 to 3 qt Ramrod 4L would provide equivalent rates of propachlor. Propachlor wp may cause skin irritation. No carryover for next season. Minimum carrier is 25 gpa for ground application. Do not graze or feed forage to dairy cattle.

PREEMERGENCE: As for Ramrod alone. Do not incorporate.

Ramrod + Milogard (PROPACHLOR + PROPAZINE)

2½-3 qt Ramrod 4L + .8-1 qt Milogard 4L

Grain sorghum. Tank-mix. Very good annual grass control. Fair to good control of several small-seeded annual broadleaves. Less consistent control in major sorghum area than some other combination treatments. May be applied in liquid fertilizer carrier. Minimum carrier is 20 gpa. Refer to sections for Ramrod or Milogard alone. Note carryover crop limitations. Appears to have limited potential for widespread use.

PREEMERGENCE: As for Ramrod or Milogard alone.

Dual + Igran (METOLACHLOR + TERBUTRYNE)

1¼-2 pt Dual 8E + 1½-2 lb Igran 80W

Grain sorghum treated with Concep (safener). Not adequately tested. Very good annual grass control expected. Annual broadleaf control better than with Dual alone or with Dual + Milogard, but less than with Dual + atrazine. Slightly better crop tolerance than Dual + atrazine. Seed must be treated with Concep (safener) by the seed company. Refer to application directions for Dual alone and to Igran section for performance of Igran. No carryover for next year.

SHALLOW PREPLANT INCORPORATED: Incorporate as for Dual alone.

PREEMERGENCE: Refer to Dual or Igran section.

Dual + Milogard (METOLACHLOR + PROPAZINE)

Milocep

1¼-2 pt Dual 8E + 1½-2½ lb Milogard 80W or 1¼-2 qt Milogard 4L

3-5 pt Milocep

Grain sorghum treated with Concep (safener). Tank-mix or use Milocep commercial premix containing 36% metolachlor (Dual) and 10% propazine (Milogard). Limited data. Slightly less weed control and slightly better crop tolerance than Dual + atrazine. Sorghum seed must be treated by the seed company with Concep (safener).

Use low rate on light, low organic matter soil. Rate of 4 pt/A Milocep suggested for most soils. Do not use on sands. May be applied in liquid fertilizer. Minimum carrier for Milocep is 15 gpa. Minimum carrier for tank-mix is 10 gpa for ground or 2 gpa for air. Refer to Milogard section for carryover crop limitations. Dual + atrazine preferred for most situations.

SHALLOW PREPLANT INCORPORATED: As for Dual alone.

PREEMERGENCE: As for Dual alone.

Lasso + Milogard (ALACHLOR + PROPAZINE)

2-3 qt Lasso + 1-1.3 lb Milogard 80W or .8-1 qt Milogard 4L

Grain sorghum treated with fluorozole (Screen) safener. Tank-mix. Limited data. Expected to be less effective than Lasso + atrazine. Sorghum seed must be treated with safener. Not for sandy soil. May be applied in liquid fertilizer. Rotate only to corn or soybeans for 18 months after application.

PREEMERGENCE: As for Lasso alone.

Igran (TERBUTRYN)

2-3 lb Igran 80W

PREEMERGENCE: Grain sorghum. Limited tests indicate good control of some annual broadleaves and fair to good control of foxtail when rainfall received. Marginal crop tolerance. Considerable risk of injury on light, calcareous or alkali soils or with cool soil temperature or if heavy rain received before crop is 2 inches tall. Minimum soil temperature is 60°F. Apply within 2 days of planting. Minimum carrier is 20 gpa for ground or 5 gpa for air. No carryover for next season.

Igran + Atrazine (TERBUTRYN + ATRAZINE)

2-2½ lb Igran 80W + 1½ pt atrazine 4L or 1 lb atrazine 80W

PREEMERGENCE: Grain sorghum. Tank-mix. Limited to heavy soils. Limited tests. Good broadleaf control but less foxtail control and less crop tolerance than some other combinations. Improves control of barnyardgrass, crabgrass, and fall panicum when compared to atrazine alone. Appears to have limited potential in major sorghum areas. Refer to Igran section. See atrazine section for carryover crop limitations.

Igran + Milogard (TERBUTRYN + PROPAZINE)

2-2½ lb Igran 80W + ½ lb Milogard 80W or 1 pt Milogard 4L

PREEMERGENCE: Grain sorghum. Tank-mix. Slightly better crop tolerance than for Igran + atrazine combination. Limited tests. Fair to good broadleaf control, but less grass control and less crop tolerance than some other combinations. Appears to have very limited potential. Refer to Igran section. Refer to Milogard section for carryover crop limitations.

Treflan (TRIFLURALIN)

¾-2 pt Treflan

POSTEMERGENCE INCORPORATED: Grain sorghum. Intended to provide control of late season grasses. Apply after sorghum is 8 inches tall and incorporate with cultivator. Field should be cultivated before application to control emerged weeds and to move untreated soil over the root area. Not labeled for preplant or preemergence as injury can be severe. Appears to have limited potential.

NO-TILL

Grain sorghum works well in reduced or no-till systems. Several soil applied herbicides described previously are available for use at planting in minimum till systems. These systems utilize shallow tillage to destroy emerged weeds at planting. For no-till, residual or contact herbicides replace seedbed tillage operations. Herbicides specifically for no-till grain sorghum are listed in the section below.

AAtrex, Atrazine (ATRAZINE)

Grain sorghum. Provides good to excellent control of several annual broadleaves including wild buckwheat, Russian thistle, pennycress, and kochia. Excellent for downy brome. Foxtail control frequently not satisfactory. Does not control witchgrass. Volunteer grain may escape.

Several formulations are available. Minimum carrier with ground equipment is 5 gpa. For air, minimum is 1 gal carrier per pound of 80W or AAtrex Nine-0 or 2 gpa for 4L formulation.

Atrazine may be used in the following no-till systems.

WHEAT-SORGHUM-FALLOW
6 pt atrazine 4L or 3¾ lb atrazine 80W or 3⅓ lb AAtrex Nine-0

Apply atrazine in wheat stubble as soon as possible after wheat harvest. Lower rate (2 lb/A active) has provided fair short-term control when risk of carryover must be minimized. The full rate is suggested for most situations.

Contact herbicide or tillage is required to control emerged weeds or volunteer grain. Paraquat at 1 to 2 pt/A plus X-77 at 2 pt/100 gal of solution or 2,4-D ester can be tank-mixed with atrazine. Roundup at ½ to 2 pt/A alone or in a tank-mix with 2,4-D or dicamba can be applied separately. Refer to section for each herbicide. Blade or sweep cultivation after atrazine application can be used to eliminate emerged vegetation in minimum till systems.

Wheat-sorghum-fallow rotation must be followed. Limited experience indicates atrazine levels are usually reduced sufficiently to allow the following wheat crop. Carryover risk greatest under dry seasons and with high soil pH (over 7.5).

Additional preemergence herbicide (such as Ramrod) is usually required, especially where annual grasses are heavy.

CONTINUOUS ROW CROP
2-3 lb atrazine 80W or 1.6-2.4 qt atrazine 4L + 1-2 pt paraquat

Apply at planting. Add X-77 surfactant at 2 pt/100 gal. Must be used in corn or sorghum rotations. Rainfall required. Less consistent than systems using residual herbicides during the fallow period. Refer to atrazine sections.

Bladex (CYANAZINE)

2-3 lb Bladex 80W

2-3 lb Bladex 80W + .8 qt atrazine 4L or 1 lb atrazine 80W

2 lb Bladex 80W + 2 pt Dual 8E

Grain sorghum. Approved for early preplant application according to specified time interval before planting. Not to be used as a preemergence planting-time treatment. Provides good to excellent control of several annual broadleaves including lambsquarters, Russian thistle, kochia, and pennycress. Weak on pigweed. Grass control varies. Very good control of downy brome; good on witchgrass and fair to good on foxtail. Rainfall required. Does not control emerged weeds. Tillage or other herbicides required if weed or volunteer grain are emerged at time of application.

EARLY PREPLANT ONLY: Apply in early spring before weed emergence. Intended to control early season weeds and give residual activity. This gives additional time for adequate rainfall for other planting-time herbicides. The application to planting interval is important for crop safety. Minimum interval is 30 days for 2 lb/A Bladex 80W and 45 days if 3 lb/A Bladex 80W is used.

Bladex rates suggested appear to be satisfactory for most situations. Rate may be increased ½ to 1 lb/A for very heavy soils with over 3% organic matter. Use only Bladex 80W formulation. Minimum carrier is 15 gpa for Bladex 80W, 20 gpa for paraquat combinations. Use no-till planting equipment to minimize disturbance of herbicide layer in the topsoil. Additional preemergence or postemergence herbicides are required for full season control. These herbicides (such as Ramrod) may be banded to reduce cost, especially if the crop is cultivated at least once during the season. Banvel or 2,4-D are postemergence options for broadleaved weeds.

Bladex-80W early preplant options are listed below.

2-3 lb/A Bladex 80W
For use where atrazine sensitive crops must follow in the rotation. Use the higher rate for soil over 3% organic matter.

2-3 lb/A Bladex 80W + 1 lb/A atrazine 80W or .8 qt/A atrazine 4L
Tank-mix. Atrazine extends residual control of annual broadleaves. Better pigweed control than Bladex alone. Small grain or other sensitive crops cannot be planted the following year. Use the higher Bladex rate on heavier soils.

2 lb/A Bladex 80W + 2 pt/A Dual 8E
Tank-mix. Dual improves early season foxtail control. Less effective on broadleaves than Bladex + atrazine combinations. Use only on seed which has been commercially treated with Concep safener.

Paraquat-Plus or Gramoxone (PARAQUAT)

1-2 pt Paraquat-Plus or Gramoxone

Paraquat is a non-selective, non-residual, contact herbicide which may be used at planting in combination with other herbicides in no-till or reduced tillage systems. Paraquat controls emerged grasses and broadleaves and kills topgrowth of perennials. Weather and temperature have less effect than weed size on performance. Cheatgrass after boot or heading stage is usually not controlled. Rates of 1 to 1½ pt/A paraquat are adequate for most small weeds; high rate is for larger weeds or dense stands. Weeds under 4 inches usually are controlled by the lower rate. Apply in a minimum of 20 gpa carrier for ground or 5 to 10 gpa for aerial equipment. Paraquat is highly toxic; follow handling and safety precautions. Restricted Use Pesticide. Several combination treatments are listed below.

Amount of Paraquat-Plus or Gramoxone to be tank-mixed with other herbicides. Refer to section for each herbicide alone. Add X-77 surfactant at 2 pt/100 gal solution.

1-2 pt paraquat + 2-3 lb atrazine 80W

1-2 pt paraquat + 1.6-3.2 pt atrazine 4L or 1-2 lb atrazine 80W + 2-2½ lb Igran 80W

Roundup (GLYPHOSATE)

1 pt-4 qt Roundup

Grain sorghum. Roundup is a non-selective, translocated, foliage applied herbicide. Useful to control emerged annual grasses and volunteer sorghum and seedling small grain. All emerged vegetation will be damaged or killed. No soil residual.

Rate for most perennial weeds is 2 to 4 qt/A. Weeds frequently have not developed sufficiently to give significant stand reduction when applied just prior to planting.

The rate for most annual weeds is 1 to 2 pt/A. Rates as low as ¼ pt/A will control small actively growing foxtail (24(c) label). Rates of ½ to ¾ pt/A are suggested for most annual weeds, volunteer sorghum, or small grain. Minimum rate for rye or pennycress is 1 pt/A. May be tank-mixed with ½ to 1 pt/A Banvel or 1 to 2 pt/A 2, 4-D to control most broadleaves prior to planting sorghum the following season. Apply in minimum of 3 gpa carrier. Add surfactant at 2 qt/100 gal of solution.

PREPLANT: Apply Roundup to emerged weeds anytime before planting up to sorghum emergence. Do not apply after crop shoots have reached the area just below the soil surface.

Herbicide Cost

The table below gives the cost per acre for several herbicide treatments using suggested retail prices. The cost listed is for the low and high rate. Prices vary according to location or quality and frequently are somewhat less than shown. Consult your local dealer for actual prices.

TREATMENT	AMT OF PRODUCT/A	HERBICIDE COST/A
Ramrod	4-5 qt	$17.00-22.50
Ramrod + atrazine	2-4 qt + 1-1½ pt	11.50-22.00
Ramrod + Modown	2½-4 qt + 3-4 pt	20.00-33.00
Ramrod + Bladex	4 qt + 2 lb	26.50
Dual	1½-2½ pt	10.50-17.50
Dual + atrazine	1½-2 pt + 1-1½ qt	11.00-18.00
Lasso	2½-4 qt	15.20-25.00
Lasso + atrazine	2-3 qt + ¾-1¾ qt	14.20-22.50
atrazine + oil	1¼ qt	5.30
2,4-D (4 lb)	1 pt	1.00
Banvel (4 lb)	½ pt	3.60
ME4 Brominal	½-1 pt	5.50-11.00
Paraquat, Gramoxone	1-2 pt	6.00-12.00
Bladex 80W	2-3 lb	8.50-12.75
atrazine 80W	1-3 lb	2.20-6.60
Roundup	1-2 pt	10.00-20.00